

# Prevalence and Reasons for Extraction of Over-retained Primary Teeth: A Retrospective Study.

**Ifueko Patience OSAGHAE**

Department of Oral/Maxillofacial Surgery, Edo Specialist Hospital Benin, Edo State.

## Correspondence

**Dr Ifueko P. Osaghae**

Department of Oral/Maxillofacial Surgery, Edo Specialist Hospital Benin, Edo State.

Email address: [ifuekoosaghae@gmail.com](mailto:ifuekoosaghae@gmail.com)

## ABSTRACT

**Objectives:** To determine the prevalence and duration of over-retained primary teeth and assess the reasons for their extractions after the elapsed age of natural exfoliation.

**Methods:** This was a retrospective cross-sectional study of patients who presented at the Oral and Maxillofacial Surgery department of the Central Hospital with over-retained primary teeth from June 2018 to June 2021. Data was collected on patients who underwent primary tooth extractions, including the number of teeth extracted. Patients aged 14 years and older were included in the study at the time of extraction. Data extracted from patient records included age, gender, extracted tooth type and location, diagnosis for extraction, and the interval between the expected age of natural exfoliation and the actual extraction date. Data were analysed using Microsoft Excel, version 10. Descriptive statistics, in the form of frequencies and percentages, were generated and presented in tabular and graphical formats.

**Results:** Data from 291 patients' clinical records with ages ranging from 14 to 45 years were retrieved and analysed. Eleven (32%) were males, while 23(68%) were females. The prevalence of over-retained primary teeth was 11.7%. Retained teeth with their successor close by in the same arch, referred to as "Double teeth" by the patients, accounted for more (39%) as the reason for the extraction. Fifty-two percent of extracted over-retained primary teeth were found in the mandible and 48% in the maxilla, with equal distribution between the left maxilla and right mandible (28%, n=13 each). Forty-eight percent of the extracted tooth was the primary canine. The longest over-retained tooth was the primary mandibular right canine, and in a duration of 32 years, seen in a 45-year-old patient.

**Conclusion:** The prevalence of over-retained primary teeth was low; the primary mandibular right canine was the most persistent tooth, and the presence of "Double teeth" in patients' words was the most common reason for extraction.

**Keywords:** Primary teeth, physiologic exfoliation, extraction

**Ifueko P. Osaghae**

<https://orcid.org/0000-0001-6881-4850>

*Received: 5-Aug, 2024*

*Revision: 10 Nov, 2024*

*Accepted: 11 Nov, 2024*

*Citation: Osaghae IP. Prevalence and reasons for extraction of over-retained primary teeth: a retrospective study. J Paediatr Dent Res Pract 2024; 5(2): 46-51. <https://dx.doi.org/10.4314/jpdrp.v5i2.1>*

### INTRODUCTION

Extraction has been identified as the most frequently considered treatment plan for retained/persistent primary teeth.<sup>1,2</sup> A primary tooth is described as persistent when it has not exfoliated within one year of the expected time of eruption of its permanent successor.<sup>2</sup> This persistence of a primary tooth is a condition that has been observed in the mixed dentition phase: the developmental stage where the permanent tooth is erupted, but the primary tooth has not completely exfoliated.<sup>3</sup>

The natural exfoliation of primary teeth typically occurs between the ages of six and twelve, with variations among individuals and specific teeth. Most primary teeth are replaced by permanent teeth by age thirteen,<sup>4</sup> their persistence beyond this age is not uncommon.<sup>5</sup> As identified in panoramic-radiographic studies, congenital absence and impaction of successor's teeth are primary factors contributing to retained primary teeth.<sup>2</sup> Additionally, systemic diseases and local factors can contribute to delayed exfoliation or persistence of primary teeth.<sup>6,7</sup> The exact mechanism of primary tooth exfoliation may involve pressure resorption of the primary root invoked by the erupting successional tooth and or differentiation of monocytes of the periodontal ligament into odontoclasts. The odontoclasts then resorb the primary root like osteoclasts during bone remodeling or resorption without an inflammatory response.<sup>8</sup> Impaired function of odontoclasts can play a role in the restriction of root resorption. Osteoclasts, as well as odontoclasts, are thought to be regulated by the extracellular matrix protein osteopontin (OPN). A deficiency of this protein is known to result in a more substantial decrease in odontoclastic than osteoclastic activity.<sup>9</sup>

Persistent primary teeth often remain functional for several years but can lead to severe caries, periodontitis, and infraocclusion.<sup>2</sup> Primary tooth extraction is indicated when there is increased mobility, dental infections, underlying pathology, poor positioning, or aesthetic concerns.<sup>5</sup>

This study, therefore, aimed to determine the prevalence and duration of over-retained primary teeth and also assessed the reasons for their extractions after the age of natural exfoliation.

### MATERIALS AND METHODS

This retrospective cross-sectional study analysed patient records from the Oral and Maxillofacial Surgery department from June 2018 to June 2021. Data was collected on patients aged 14 years and older who underwent primary tooth extractions during the period under review. Data extracted from

patient records included age, gender, extracted tooth type and arch, diagnosis for extraction, and the interval between the expected age of natural exfoliation and the actual extraction date.

The inclusion criteria include hospital records of patients whose primary teeth were extracted after the expected age of exfoliation. In contrast, cases where primary teeth were extracted within the physiological exfoliation period were excluded.

The protocol for this study was reviewed by the Ethics and Research Committee of the Ministry of Health, Edo State. Ethical approval number HA/737/22/C/181100131 was given as proof of acceptance.

### Data analysis:

Data were inputted and analysed using Microsoft Excel, version 10. Descriptive statistics, including frequencies and percentages, were generated and presented in tabular and graphical formats.

### RESULTS

A total of 291 patients aged between 14 and 45 years presented for dental treatment during the period under review. Out of these, thirty-four patients had their primary teeth extracted after the age at which the natural exfoliation had come to an end, giving a prevalence of persistent primary teeth in this study at 11.7%. Eleven patients were males, while 23(68%) were females. The majority (24) of over-retained primaries were seen in the mandibular arch (52%, n=24), with equal representation seen on both the right mandible and left maxilla (28%, n=13). [Table 1]

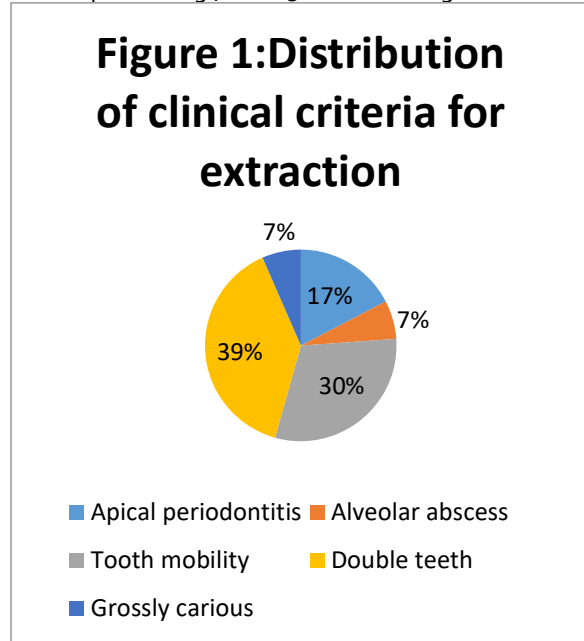
**Table 1: Study population demography and over-retained primary tooth per arch and quadrant**

Variable	Number	Percentage
Whole Patient population	291	
Study Population	34	11.7
<b>Gender</b>		
Male	11	32
Female	23	68
<b>Arch</b>		
Maxilla	22	48
Mandible	24	52
<b>Quadrant</b>		
Maxillary right	9	20
Maxillary left	13	28
Mandibular right	13	28
Mandibular left	11	24

The primary indication for extraction in this study was the presence of a persistent primary tooth

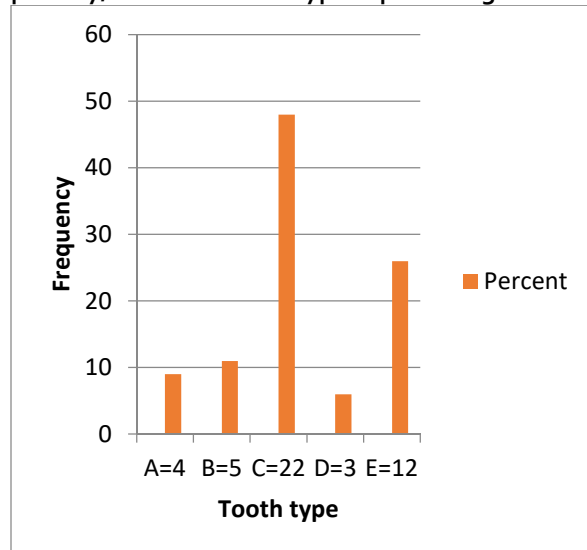
## Prevalence of over-retained primary teeth

alongside the erupted permanent tooth, designated as "double teeth" (39%, n=18), followed by tooth mobility (30%, n=14). Gross caries and alveolar abscess accounted for the least frequent indications, each representing 7% (n=3) of cases. (Figure 1)



Primary canines were the most frequently over-retained tooth and then extracted, comprising 48% (n=22) of all cases, followed by primary second molars at 26% (n=12). [Figure 2]

**Figure 2: Distribution of over-retained primary/extracted tooth type in percentage**



Five patients were 14 years old, followed by the 17-year-olds (n=4), with smaller groups at ages 16 and 27 (n=3). The fourteen-year-olds had the highest

extracted teeth (n=7), closely followed by the 16 and 17-year-old groups (n=6 each). The longest interval between expected exfoliation and actual extraction was 32 years in a 45-year-old patient with a retained right mandibular canine. [Table 2]

**Table 2: Distribution of age, number of patients, teeth extracted, and length of time after normal age of exfoliation.**

Age (years)	Number of patients	Number of teeth	Number of years of over-retention
14	5	7	1
15	2	2	2
16	3	6	3
17	4	6	4
18	2	5	5
19	2	2	6
21	1	1	8
22	1	1	9
23	2	2	10
24	1	1	11
25	2	2	12
27	3	4	14
29	2	2	16
34	1	1	21
36	1	1	23
39	1	1	26
45	1	1	32
Total	34	46	17

**Table 3 shows the distribution of age and the type of primary teeth extracted in the different arches.**

Out of the 17 different age in years of the patients in this study, which fell between the age range of 14 to 45 years, 77% (13) had canine tooth extraction, as illustrated.

**Table 3: Distribution of age and tooth type extracted**

## Prevalence of over-retained primary teeth

Age (years)	Tooth	
	Maxilla	Mandible
14	52,63	75,75,82,84,85
15	53	73
16	51	75,83,84,85,85
17	53,53,55,63,63,63	-
18	63	71,72,81,82
19	54	75
21	-	83
22	63	-
23	53,61	-
24	63	-
25	62,63	-
27	-	73,73,83,85
29	63,63	-
34	55,65	-
36	-	75
39	-	73
45	-	83

### DISCUSSION

The natural exfoliation of primary teeth typically occurs between the ages of six and twelve, with variations among individuals and specific teeth. Most primary teeth are replaced by permanent teeth by age thirteen.<sup>4</sup> A primary tooth is described as persistent when it has not exfoliated within one year of the expected time of eruption of its permanent successor.<sup>2</sup> Congenital absence and impaction of successor's teeth are primary factors contributing to retained primary teeth.<sup>2</sup> Additionally, systemic diseases and local factors can contribute to delayed exfoliation or persistence of primary teeth.<sup>6,7</sup>

The prevalence of persistent primary teeth requiring extraction in this study was 11.7%, lower than the 16.6% reported by Onyeaso<sup>10</sup> among orthodontic patients in Nigeria. This discrepancy might be attributed to the study's specific focus on patients aged 14 years and older, a demography beyond the typical exfoliation period.<sup>2,4,5</sup>

The longest retention observed in this study was a mandibular canine in a 45-year-old patient, representing a 32-year persistence. This finding aligns with historical data reported by Brook.<sup>11</sup> A 26-year retention period involving a maxillary canine observed in this study is consistent with a previous study.<sup>11</sup>

Consistent with previous research, a female predominance among patients requiring extraction of persistent primary teeth was observed.<sup>12</sup>

Additionally, the mandible was identified as the more common site for these teeth, corroborating findings from other studies.<sup>3,23</sup>

This study found that canines were the most frequently extracted primary teeth, followed by second molars, with first molars being the least common. These findings align with the literature, which suggests that teeth with longer, more deeply embedded roots, such as canines and molars, are more likely to persist compared to incisors with single, shorter roots.<sup>7</sup>

Persistent primary teeth can lead to complications, including caries, periodontitis and infraocclusion.<sup>14</sup> The primary reason for extraction in this study was the presence of "double teeth", which was operationally defined as persistent primary teeth growing alongside their erupted permanent successor,<sup>3</sup> often resulting in an aesthetically displeasing appearance, which then induces the request for extraction.<sup>15</sup> This can result from the early eruption of permanent teeth among children with non-proportionate jaw growth, resulting in the lingual or palatal eruption of the permanent teeth.<sup>16</sup>

This finding underscores the significant impact of these dental anomalies on patients' quality of life.<sup>5,15</sup> Tooth mobility, the second most common indication for extraction, is often associated with physiological root resorption, therefore, no inflammatory response, and is induced by the erupting permanent tooth.<sup>8</sup> However, it is important to note that root resorption can occur even without a successor.<sup>5,17</sup>

Apical periodontitis, frequently caused by caries,<sup>18</sup> and alveolar abscesses, which can be exacerbated by the complex root canal system of primary molars,<sup>19</sup> were common indications for extraction. Extensive caries also necessitated extractions in a significant proportion of cases. Traditionally, extraction has been the primary treatment for persistent primary teeth.<sup>2</sup> However, with advancements in paediatric dentistry, restorative options are increasingly being considered, especially where the succedaneous tooth is missing. The most prevalent cause of persistent primary teeth is the congenital absence of the permanent successor, as evidenced by previous research.<sup>14</sup> Other contributing factors include severe caries and various pathological conditions such as odontogenic cysts and fibrous dysplasia.<sup>20</sup>

The aetiology of persistent primary teeth involves complex cellular mechanisms. Dysregulation of osteoclasts and odontoclasts, responsible for root resorption, has been implicated in abnormal tooth shedding.<sup>21</sup> Supporting this, Ith-Hansen and Kjaer<sup>22</sup> documented a case of minimal root resorption in a

## Prevalence of over-retained primary teeth

primary molar 16 years post-expected exfoliation. Systemic factors can also influence this process. For instance, STAT3 hyper-IgE syndrome, characterized by immunodeficiency and inflammation, has been associated with delayed root resorption and persistent primary teeth.<sup>23,24</sup>

Given the potential longevity of persistent primary teeth, a comprehensive assessment is crucial for treatment planning. These teeth can exhibit remarkable durability, sometimes rivalling the survival rates of dental implants or fixed restorations.<sup>25</sup>

### Limitation of study

A fundamental limitation of this retrospective study was the reliance on existing patient records. Consequently, data on medical history and socioeconomic status were unavailable, restricting a more comprehensive analysis of potential associated factors influencing the persistence of primary teeth.

### CONCLUSION

This study revealed a low prevalence of persistent primary tooth extractions, likely due to the study's focus on a specific age group. However, the data indicate that these teeth can persist for extended periods, with a maximum observed retention of 32 years. Canines were the most commonly extracted persistent teeth. Persistent primary teeth were removed more often due to aesthetic concerns or increased mobility rather than underlying pathology.

### Financial support

Nil

### Conflict of interest

None declared

### REFERENCES

1. Chukwumah NM, Azodo CC, Orikpete EV. Analysis of tooth mortality among Nigerian children in a tertiary hospital setting. *Ann Med Health Sci Res.* 2014; 4:345–349.
2. Aktan AM, Kara I, Sener I, et al. An evaluation of factors associated with persistent primary teeth. *Eur J Orthod.* 2012; 34(2):208–12.
3. Lestari ZD, Wibowo TB, Pradopo S. The prevalence of over-retained primary teeth and malocclusion in 6-12 years old children. *IJPD* 2010; 2(1):9.
4. ADA Division of Communications; Journal of the American Dental Association; ADA Council on Scientific Affairs. For the dental patient. Tooth eruption. The primary teeth. *J Am Dent Assoc.* 2005 Nov; 136 (11):1619. doi:10.14219/jada.archive.2005.0095.PMID:16329427.
5. Robinson S, Chan M. F. W-Y. New teeth from old: treatment options for retained primary teeth. *Br Dent J* 2009; 207 (7):315–320.
6. Marimo C. Delayed exfoliation of primary teeth due to second pathoses: Case series study. *Med. J. Zambia* 2009; 36(2):92–94.
7. Meixner I, Hagl B, Kröner CI, et al. Retained primary teeth in STAT3 hyper-IgE syndrome: early intervention in childhood is essential. *Orphanet J Rare Dis* 2020; 15:244: 1–8 <https://doi.org/10.1186/s13023-020-01516-3>.
8. Harokopakis-Hajishengallis E. Physiologic root resorption in primary teeth: molecular and histologic events. *J Oral Sci.* 2007 Mar; 49(1):1–12.
9. Chung CJ, Soma K, Rittling SR, et al. OPN deficiency suppresses appearance of odontoclastic cells and resorption of the tooth root induced by experimental force application. *J Cell Physiol.* 2008; 214(3):614–20.
10. Onyeaso CO. Incidence of retained deciduous teeth in a Nigerian population: An indication of poor dental awareness/attitude. *Odontostomatol Trop.* 2005;(28):5–9.
11. Brook AH. Dental anomalies of number, form and size: their prevalence in British school children. *J Int Assoc Dent Child.* 1974; (5):37–53.
12. Temilola DO, Folayan MO, Fatusi O, et al. The prevalence, pattern and clinical presentation of developmental dental hard-tissue anomalies in children with primary and mixed dentition from Ile-Ife, Nigeria. *BMC Oral Health.* 2014; (14):125. doi: 10.1186/1472-6831-14-125.
13. Olatosi OO, Sote EO. Causes and pattern of tooth loss in children and adolescents in a Nigerian Tertiary Hospital. *Nig. Qt J. Hosp. Med.* 2012; 22(4): 258–262.
14. Aktan AM, Kara I, Şener İ, et al. An evaluation of factors associated with persistent primary teeth. *Eur J Orthod.* 2011; 34(2):208–12.
15. Osaghae IP, Azodo CC. "Shark Teeth" like appearance among paediatric dental patients. *IOSR Journal of Dental and Medical Sciences (IOSR\_JDMS).* 2018; 17(2):12–15.
16. Onyejaka NK, Amobi EO, Osadolor O. Evaluation of tooth mortality among children attending a paediatric dental clinic in southeast, Nigeria. *J Paediatric Dent Res Pract.* 2021; 2 (1&2):16–22.
17. Rune B, Sarnas KV. Root resorption and submergence in retained deciduous second molars. A mixed longitudinal study of 77 children

## Prevalence of over-retained primary teeth

- with developmental absence of second molars. *Eur J Orthod.* 1984; (6):123–131.
18. Kazemina M, Abdi A, Shohaimi S, et al., Dental caries in primary and permanent teeth in children worldwide, 1995 to 2019: a systematic review and meta-analysis. *Headface Med.* 2020; 16(1):22.
  19. Da Silva LA, Fernandes PM, da Silva RA, et al. SEM study of apical morphology alterations in primary teeth with vital and necrotic pulps. *Ultrastruct. Pathol.* 2009; 33(5):183–188.
  20. Hattab FN, Segura JJ. Simultaneous presence of primary second molar and second premolar in the same jaw of adult male: Report of case. *Dental News.* 2003; (11):9–11.
  21. Wang Z, McCauley LK. Osteoclasts and odontoclasts: signaling pathways to development and disease. *Oral Dis.* 2011; 17(2):129–42.
  22. Ith-Hansen K, Kjaer I. Persistence of deciduous molars in subjects with agenesis of the second premolars. *Eur J Orthod* 2000; (22):239–243.
  23. Grimbacher B, Holland SM, Gallin JI, et al. Hyper-IgE syndrome with recurrent infections--an autosomal dominant multisystem disorder syndrome with recurrent infections--an autosomal dominant multisystem disorder – an autosomal dominant multisystem disorder. *N Engl J Med.* 1999; 340(9):692–702.
  24. Esposito L, Poletti L, Maspero C, et al. Hyper-IgE syndrome: dental implications. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2012; 114(2):147–53.
  25. Pjtursson PE, Lang NP. Prosthetic treatment planning on the basis of scientific evidence. *J Oral Rehabil* 2008; (35 Suppl 1): 72–79.